

NON-PUBLIC?: N
ACCESSION #: 9405200147
LICENSEE EVENT REPORT (LER)

FACILITY NAME: MONTICELLO NUCLEAR GENERATING PLANT PAGE: 1 OF 5

DOCKET NUMBER: 05000263

TITLE: Transmission System Electrical Fault Causes Loss of Circulating Water Pumps Resulting in a Reactor Scram
EVENT DATE: 04/15/94 LER #: 94-003-00 REPORT DATE: 05/16/94

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
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COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

A transmission system electrical fault on the 345 kV system (originating at a nearby generating plant) caused protective relaying to trip plant equipment. The tripping of the Circulating Water Pumps caused the loss of the condenser vacuum, which caused a reactor scram. The electrical fault caused a decrease in voltage to approximately 55% for 2 to 3 cycles. A modification will be initiated to reduce the likelihood of similar substation transients initiating a reactor scram.

END OF ABSTRACT

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Description:

On April 15, 1994, at 1809, while operating at 100% power, an electrical fault on the 345 kV transmission system (EHS System Code: FK) caused protective relaying to trip plant equipment. The electrical fault was caused by the failure of a wave trap (EHS Component Code: CL) connection at a nearby generating plant substation (A wave trap is used to pick up high frequency signals transmitted over the system transmission lines to provide line protective relaying). The fault caused the voltage in the Monticello 345 kV substation to drop to approximately 55% for 2 to 3 cycles (one cycle = 1/60 of a second). This caused the following action:

ACTIONS CAUSE EHS
OCCURRING (System/
AT TIME 1809 Component
Code)

Both (all) Normal action for a low voltage event. AD/P
Recirculation
Pumps trip

Both (all) The Circulating Water Pumps are powered KE/P
Circulating by synchronous motors, having power factor
Water Pumps trips. The low voltage condition caused the
tripped power factor relays to sense a false low
power factor condition which tripped the
motors.

Emergency The relays that switch the system into VI
Filtration the high radiation mode are normally
Train System energized. The low voltage condition
shifted to the caused the system to change to the High
high radiation Radiation mode. No high radiation
Mode condition existed, the system responded
to the momentary low voltage.

120 VAC Non-1E Normal action for a low voltage event EE
Distribution
Panel, Y-20,
switched to
its redundant
source

The tripping of both Recirculation Pumps placed the reactor in natural
circulation, causing reactor power to decrease to approximately 45%.
Sinc
no

Recirculation Pumps were operating, the Senior Reactor Operator ordered a manual reactor scram. This action was in accordance with plant procedures in the implementation process (the procedures had been reviewed by the Operations Committee but all shifts had not been trained on the procedures, so they had not been issued). Before the operator could manually insert a reactor scram, an automatic scram (EIIIS System Code: JC) occurred 62 seconds after the fault.

The automatic reactor scram occurred due to a low vacuum in the main condenser (EIIIS System Code: SG). Following the loss of both Circulating Pumps, condenser vacuum rapidly decreased (pressure increased). All control rods (EIIIS System Code: AA) responded properly to the reactor scram.

Following the scram, reactor water level decreased below 9 inches, the setpoint for Group 2 and 3 Containment Isolation signals (EIIIS System Code: JM). All automatic actions occurred properly. In order to prevent an automatic high reactor water level trip of the Reactor Feedwater Pumps (EIIIS System Code: SJ)(EIIIS Component Code: P) (on the subsequent level swell), #12 Reactor Feedwater Pump was tripped 30 seconds after the scram and #11 was tripped 4 1/2 minutes after the scram.

The Circulating Water pumps, one Reactor Feedwater Pump and both Recirculation Pumps were re-started stabilizing the plant. The Emergency Filtration Train System was returned to the normal mode of operation. The 120 VAC Non-1E Distribution Panel, Y-20, was left on its redundant source as either source is an acceptable power supply.

Cause:

The primary cause of the reactor scram was an electrical fault on the 345 kV transmission system. High winds during the day of the event, caused a wave trap connection to fail. This failure placed a fault on the transmission system. The decrease in voltage associated with the fault caused plant protective relaying to trip equipment.

A contributing cause is the vulnerability of the plant protective relaying (EIIIS Component Code: 94) to momentary voltage drops. A similar event occurred in 1987 (See Similar Event discussion at the end of this report), and during the subsequent investigation it was learned that protection action may not be required for these extremely short duration low voltage conditions.

Analysis

The Reactor Protection System; Group 2 and 3 Containment Isolations; the Emergency Filtration Train System High Radiation Mode; 120 VAC Non-1E Distribution Panel, Y-20 transfer; Circulation Water Pump power factor relays and the Recirculation Pump under voltage relays were challenged by this event and all performed properly. Operations personnel responded promptly and conservatively. There were no consequences that affected public health or safety.

The Loss of Voltage relays that: 1) start the Emergency Diesel Generators and 2) switch the Engineered Safeguard Busses to another power source were not activated by this momentary low voltage. The Loss of Voltage logic requires a more sustained low voltage condition for activation to avoid unnecessary protective actions.

This event could not have had more severe consequences regardless of initial conditions.

Corrective Actions:

1. The wave trap that initiated this disturbance was repaired.
2. The wave trap connections in the Monticello substation were thermally scanned to verify that no degradation existed.
3. A modification will be initiated, and as appropriate implemented, to reduce the likelihood of similar substation transients initiating a reactor scram.

Additional Information:

Failed Component Identification:

No plant equipment failed. The failure occurred off-site at a nearby substation.

Previous Similar Event:

LER 87-014-00: This event also involved a system fault, followed by a loss of Recirculation Pumps, a loss of Circulating Water Pumps and a

fault in this event. The same plant equipment tripped in response to both events (except that a Cooling Tower Pump tripped in the 1987 event, none were running in the 1994 event). One minor difference is that the Reactor Feedwater Pumps automatically tripped on High water level in the 1987 event.

The corrective action established a task force to review this event and "investigate steps that can be taken to avoid plant trips from similar events." Following this task force, a Significant Operating Event investigated this concern (and other electrical related concerns) and recommended that changes be made to the Circulating Water Pump relays. This change had been placed on the system improvement list, but had not yet been implemented due to higher priority activities.

ATTACHMENT TO 9405200147 PAGE 1 OF 1

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May 16, 1994 Report Required by
10 CFR Part 50, Section 50.73

US Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

MONTICELLO NUCLEAR GENERATING PLANT
Docket No. 50-263 License No. DPR-22

Transmission System Electrical Fault Causes Loss of
Circulating Water Pumps Resulting in a Reactor Scram

The Licensee Event Report for this occurrence is attached. This report contains the following new commitment to the NRC.

A modification will be initiated, and as appropriate implemented, to reduce the likelihood of a reactor scram being initiated by substation transients similar to the event reported in LER 94-003.

Please contact Marv Engen, Sr Licensing Engineer, at (612) 295-1291 if you require information.

Roger O Anderson
Director
Licensing and Management Issues

c: Regional Administrator - III, NRC
NRR Project Manager, NRC
Sr Resident Inspector, NRC
State of Minnesota
Attn: Kris Sanda

Attachment

*** END OF DOCUMENT ***
